

# Unit C Electromagnetic Energy



It's just after sunset when you get an unexpected call from a friend asking you to go with her to check out an amazing light show happening tonight. If you live in northern Alberta, you might consider a few options. Are you being invited to see fireworks or a laser light show? Or is your friend asking you come out and see the aurora borealis or northern lights?

The northern lights are certainly worth seeing. Many people describe the shimmer of colours in the night sky as a giant curtain of light rippling in a gentle breeze. What makes these displays even more amazing is that they occur about 100 km above Earth's surface, with individual arcs of colour nearly 1000 km in length. Clearly, there is a significant quantity of energy involved! The same energy source that powers the aurora borealis can cause communications problems and widespread blackouts. It can even disable satellites in orbit.

Where does this energy come from? What are the connections between a beautiful light show high in the atmosphere and electrical malfunctions on satellites and within power grids?

In this unit you will investigate electromagnetic energy. You will develop a basic understanding of technologies that utilize electric and magnetic fields and electromagnetic radiation. As you will discover, electromagnetic waves play a key role in communications systems and in technologies that gather information about the northern lights and other phenomena that occur within the universe.

## ***What You Will Cover***

### **Chapter 1: Electric and Magnetic Fields**

- 1.1 Field Lines
- 1.2 Equations for Fields
- 1.3 Motors and Generators
- 1.4 Electric Circuits
- 1.5 Transmitting Electrical Energy

### **Chapter 2: The Electromagnetic Spectrum**

- 2.1 Electromagnetic Radiation
- 2.2 Astronomy